INT306:DATABASE MANAGEMENT SYSTEMS

L:3 T:0 P:2   Credits:4

Course Outcomes: Through this course students should be able to

CO1 :: explain the purpose, architecture, and components of database systems, and analyze data modeling techniques using entity-relationship and relational models.

CO2 :: demonstrate the use of SQL for defining, manipulating, controlling, and managing database transactions, ensuring data integrity through constraints and keys.

CO3 :: construct optimized queries using relational algebra, aggregate functions, SQL joins, set operators, and subqueries to solve complex data retrieval problems.

CO4 :: evaluate database designs using normalization techniques, functional dependencies, and multivalued dependencies to ensure data integrity and avoid design pitfalls.

CO5 :: develop database applications using flow control statements, stored procedures, triggers, cursors, and exception handling to automate and manage tasks efficiently.

CO6 :: analyze transaction systems, schedules, and concurrency control mechanisms to ensure serializability, recoverability, and reliability in database operations.

Unit I

Introduction to database : purpose of database systems, components of dbms, applications of dbms, three tier dbms architecture, data independence, database schema, instance, data modeling, entity relationship model, relational model

Unit II

Relational query language : introduction to data definition language, data manipulation, data control and transaction control language, integrity constraints, database keys, SQL basic operations

Unit III

Relational Operations : Aggregate functions, Sql joins, set operators, views, subqueries, relational algebra

Unit IV

Relational Database Design : Normalization- 1NF, 2NF, 3NF, BCNF, 4NF, 5NF, data integrity rules, functional dependency, need of normalization, first normal form, second normal form, third normal form, boyce codd normal form, multivalued dependencies, fourth normal form, join dependencies, fifth normal form and pitfalls in relational database design

Unit V

Programming Constructs in Databases : flow control statements, functions, stored procedures, cursors, triggers, exception handling

Unit VI

Database Transaction Processing : transaction system concepts, desirable properties of transactions, schedules, serializability of schedules, concurrency control, recoverability

List of Practicals / Experiments:

Introduction to Data Definition Language and Managing Schema Objects

- Data Definition Language
- Categorize Database Objects
- Create Tables
- Describe the data types
- Understand and Manage Constraints
- Create a table using a subquery
- How to alter a table?
- How to drop a table?
- Creating and using temporary tables
- Creating and using external tables

Data Manipulation
- Add New Rows to a Table
- Change the Data in a Table
- Use the DELETE and TRUNCATE Statements
- How to save and discard changes with the COMMIT and ROLLBACK statements
- Implement Read Consistency

Aggregated Data Using the Group Functions
- Usage of the aggregation functions in SELECT statements to produce meaningful reports
- Describe the AVG, SUM, MIN, and MAX function
- How to handle Null Values in a group function?
- Divide the data in groups by using the GROUP BY clause
- Exclude groups of date by using the HAVING clause

Display Data from Multiple Tables
- Write SELECT statements to access data from more than one table
- Join Tables Using SQL:1999 Syntax
- Natural Join
- Non equijoins
- View data that does not meet a join condition by using outer joins
- Join a table to itself by using a self join
- Create Cross Joins

SET Operators
- Describe the SET operators
- Use a SET operator to combine multiple queries into a single query
- Describe the UNION, UNION ALL, INTERSECT, and MINUS Operators
- Matching the SELECT statements
- Use the ORDER BY Clause in Set Operations

Creating Views
- Create, modify, and retrieve data from a view
- Perform Data manipulation language (DML) operations on a view
- How to drop a view?

Introduction to PL/SQL
- PL/SQL Overview
- List the benefits of PL/SQL Subprograms
- Overview of the Types of PL/SQL blocks
- Create a Simple Anonymous Block
- Generate the Output from a PL/SQL Block

PL/SQL Identifiers
- Scalar Data Types

Explicit Cursors
- Understand Explicit Cursors
- Declare the Cursor
- How to open the Cursor?

- Fetching data from the Cursor

- How to close the Cursor?

- Explicit Cursor Attributes

Exception Handling

- What are Exceptions?

- Handle Exceptions with PL/SQL

Stored Procedures and Functions

- What are Stored Procedures and Functions?

- Create a Simple Procedure

- Create a Simple Procedure with IN parameter

- Create a Simple Function

- Execute a Simple Procedure

- Execute a Simple Function

Relational Query Languages

- relational algebra

- introduction to data definition language, data manipulation

- data control and transaction control language

- integrity constraints

- database keys

- sql basic operations

- aggregate functions

- sql joins

- set operators, views

Programming constructs in Database

- flow control statements

- functions

- stored procedures

- cursors

- triggers

- exception handling

Text Books:
1. POSTGRESQL: UP AND RUNNING - A PRACTICAL GUIDE TO THE ADVANCED OPEN SOURCE DATABASE, THIRD EDITION by REGINA OBE, LEO HSU, SHROFF/O'REILLY

References:
1. SIMPLIFIED APPROACH TO DBMS by PRATEEK BHATIA AND GURVINDER SINGH, KALYANI PUBLISHERS

2. DATABASE SYSTEM CONCEPTS by HENRY F. KORTH, ABRAHAM SILBERSCHATZ, S. SUDARSHAN, MCGRAW HILL EDUCATION